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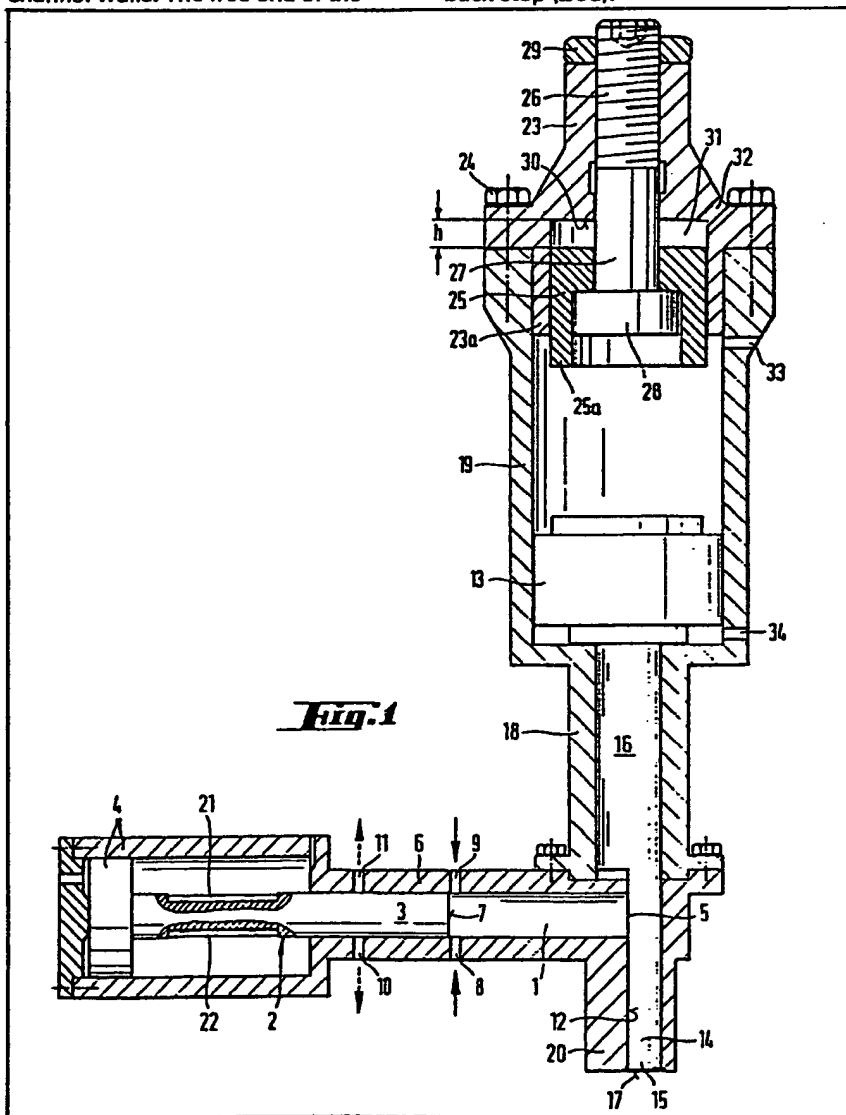
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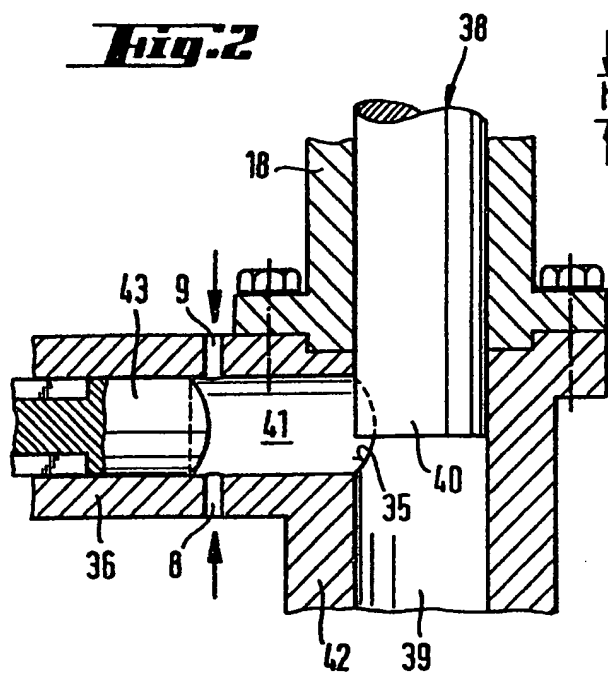
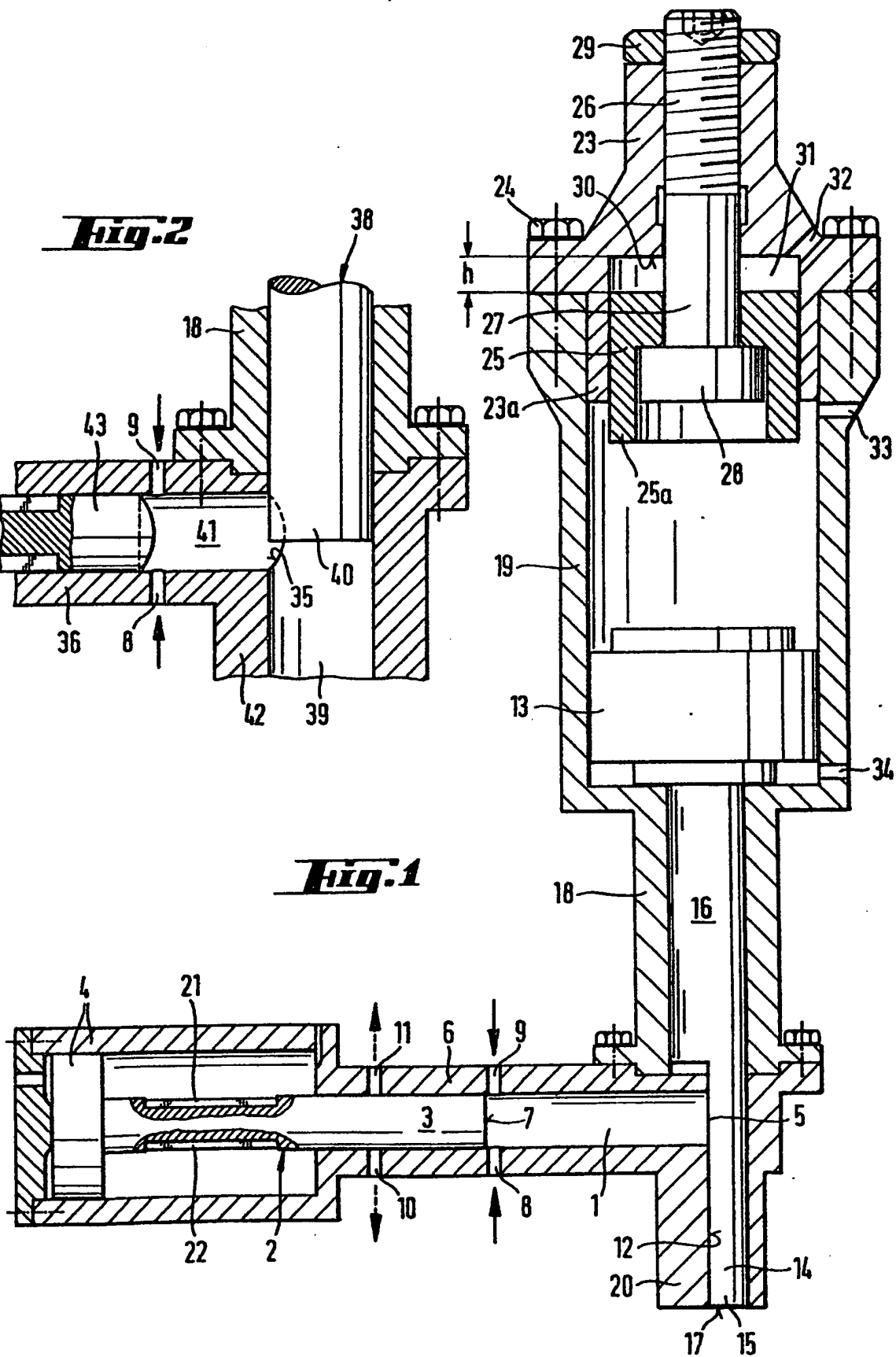
(54) Mixing and feeding plastics
material

(57) The device forms a mixture in a mixing chamber (1) and feeds it into a channel (12), which directly adjoins this chamber but is at an angle of e.g. 90°, thereto for calming the turbulent flow. The mixing chamber (1) and the channel (12) each has a reciprocable piston (3 or 14) for discharging the mixture contained therein after the feeding of the components has ceased and for cleaning the mixture chamber and channel walls. The free end of the

piston (14) provided in the channel (12) assumes the function of a restriction piece (15) for restricting discharge from the mixing chamber in that this piston can be fixed in a specific position in the zone of the transition from the mixing chamber to the channel. This restricting position can be arbitrarily cancelled in that the piston provided in the channel can be fully retracted to such an extent that a restriction no longer takes place, when, at the end of the mixing operation, it is required to leave all integral surfaces of the device clean. Retraction is enabled by retraction of a back stop (25a).



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Fig. 2**Fig. 1**

SPECIFICATION

A device for feeding a plastics material mixture, more especially a chemically reactive mixture, to a mould (mixing head)

5 In a high-pressure mixing head for reaction plastics materials according to DE PS 23 27 269, a channel provided downstream of the mixing chamber has the task of calming the plastics material component mixture, which emerges
10 turbulently from the mixing chamber, before it passes into the mould. A cleaning ram cleans the channel after each mixing phase. It is known to provide movable baffles in mixing heads for controlling the pressure in the mixing chamber
15 and for accurate dispensing even if the output rates are small (a few grammes per mixing phase), namely in the mixing chamber itself (see DE PS 20 65 841, DE AS 26 12 812) or downstream of the mixing chamber in a feed
20 channel (see DE AS 25 44 749). The expenditure relating to construction, space and control engineering is a disadvantage of the known arrangements.

From DE OS 30 40 922 there is already known
25 a mixing head wherein the cleaning ram assumes a rear position which is such that the mixing chamber outlet is partly covered and thus allows an adjustable restriction of the reaction plastics material mixture emerging from the mixing
30 chamber. This arrangement, too, has a disadvantage, namely to the effect that there are deposited on the cleaning ram part which is located upstream of the mixing chamber outlet mixture residues which pass at once or later,
35 already more or less hardened, into the mould cavity and impair the quality of the moulding.

As described in U.K. Patent Appln. No. 821 1264, this disadvantage is eliminated in that there is provided between the cleaning ram and
40 the working piston thereof an arbitrarily actuatable reciprocal displacing unit, with the aid of which the restricting position of the cleaning ram can be cancelled. The object of the present invention is to provide a simpler device for this purpose.

45 According to the invention there is provided a device for feeding a plastics material mixture, to a mould, said device comprising a mixing chamber having a piston movable between a rear position, in which the inlets for the components of the
50 mixture are left open and a front position in the region of the mixing chamber outlet where the inlets are closed off from the mixing chamber outlet, a channel which preferably directly adjoins the mixing chamber outlet and communicates,
55 directly or via further supply lines, to the mould and which is positioned relative to the mixing chamber axis at an angle, and a cleaning ram in said channel, for movement between a rear position and a cleaning position, the cleaning ram
60 being so formed that it serves at its leading end, as a throttling restriction piece, and partly covers the mixing chamber outlet, a piston and cylinder device for said cleaning ram, the actuating piston thereof or the cleaning ram bearing in its rear

65 position against a stop which is displaceable for setting different limit positions, and means for permitting a temporary displaceability of the stop during the operation of the mixing head whereby the mixing chamber outlet can be fully uncovered.

70 The invention provides a constructionally simple solution, according to which the cleaning ram and the working piston are rigidly connected together and an adjustable stop is provided. The rear position (restricting position) and the
75 rearmost position (restricting position cancelled) of the cleaning ram are brought about in that the working piston is acted on by a pressure medium on its surface that is directed towards the cleaning ram and is moved as far as the stop. In the
80 rearmost position, there can become active the adjustable stop in its end position or a fixed housing stop.

The adjustable stop is expediently actuatable by means of a pressure medium, the piston actuated
85 by the pressure medium constituting itself the movable stop and the stop being formed by an annular piston to provide a particularly simple construction for the restricting piece.

The invention will now be explained with the aid of two exemplified embodiments and with
90 reference to the drawings, in which:

FIGURE 1 shows a mixing chamber with a channel, which is provided transversely thereto, for calming the mixture and

95 FIGURE 2 shows a portion of a differently designed channel; both in a longitudinal section.

As shown in Fig. 1, there is provided in the mixing chamber 1 for producing a polyurethane mixture from two plastics material components a control element 2 which is movable along the
100 mixing chamber axis. This control element 2, which is formed on the right-hand end as a piston 3, is actuated by a piston/cylinder arrangement 4 which is formed as a unit with the control element 2 and the mixing chamber housing 6 at the end that is opposite to the mixing chamber outlet 5. In the rear end position (shown), the piston 3, with its face 7, allows the plastics material components access to the mixing chamber 1 through the inlets
105 8, 9. In the front (right-hand) end position, the piston 3 shuts the inlets 8, 9 with respect to the mixing chamber 1 and the mixing chamber outlet 5. Into the skirt of the piston 3 there have been recessed overflow channels 21, 22 which, in the
115 front end position of the piston 3, connect the inlets 8, 9 to the return lines 10, 11 which are separately provided in the mixing chamber housing 6.

At an angle of 90° to the longitudinal direction of the mixing chamber 1 and directly downstream of the mixing chamber outlet 5 there is provided a channel 12 for calming the plastics material mixture which has been turbulently produced in the mixing chamber 1 and subsequently enters the
120 channel 12. The channel 12, which is approximately semi-circular in cross section, ends, in a manner not shown herein, freely above the cavity of an open mould, in other words a mould that is still unclosed, or is connected to the cavity

of a closed mould or to the supply line leading to a mould. The face 7 of the piston 3 has been adapted to the shape of the wall of the channel 12.

5 A cleaning ram 14 can be moved longitudinally in the channel 12 in such a way that, with its lower end, it wholly or partly uncovers the mixing chamber outlet 5, with the channel 12 otherwise free, or seals this outlet while travelling to reach the channel outlet 17. Due to the fact that, in their front end positions, the piston 3 and the cleaning ram 14 can be at least flush with the outlets 5 and 17 respectively, any mixture residues are prevented from being left in the mixing chamber 1 and in the channel 12 after each mixing operation and each filling operation.

The cleaning ram 14 is actuated by a working piston 13, which is guided in a cylindrical housing 19, via a connection rod 16 which is circular in cross section. The housing 19 has been flanged via a housing part 18 to the housing part 20 receiving the cleaning ram 14. The housing 19 is sealed at the top by a cover 23 which is fastened by means of screws 24 and which, in the lower cylindrical part 23a, receives an annular piston 25 with a stop 25a and, in the upper part, receives a threaded part 26 which has an internal thread and is secured by means of a lock nut 29. The threaded part 26 continues downwardly in a shank 27 which ends in a collar 28. The collar 28 limits the movability of the stop piston 25 in the downward direction, whilst this piston bears against a face 30 of the cover 23 in the uppermost position. Between the face 30 and the upper face of the stop piston 25 there is located a pressure chamber 31 which can be filled with a pressure medium via a bore 32, during which process the stop piston 25 is moved downwardly as far as the stop on the collar 28.

40 The working piston 13 is moved downwards by means of a pressure medium fed via a bore 33 and is moved upwards by means of a pressure medium fed via a bore 34. When the working piston 13 is moved from the position shown in Fig. 1, which it has had after a mixing operation, during which process the mixture residues have been pressed from the channel 12 in the downward direction, upwardly by the feeding of the pressure medium via the bore 34 until it bears against the stop piston 25 and the lower end of the cleaning ram 14 (restriction piece 15) partly covers the mixing chamber outlet 5 and when the piston 3 is in the position shown in Fig. 1, the mixing head is prepared for the next mixing operation. This operation is initiated by feeding plastics material components into the mixing chamber 1 at high pressure. Therein, thorough mixing of the components is effected. The mixture flow passes via the mixing chamber outlet 5, which is throttled by the restriction piece 15, with a deflection of 90° into the channel 12, in which there is brought about initially, if necessary, a further mixture refinement but then in any event the calming of the turbulent flow so that the mixture emerges

65 from the channel outlet 17 in a laminar flow.

If it is intended to terminate the mixing operation, the piston 3 is moved to the right by the piston/cylinder arrangement 4. This causes three things to happen: a) the connection of the inlets 8, 9 to the mixing chamber 1 is interrupted; the component flows are now returned via the overflow channels 21, 22 to the return lines 10 and 11 and then to vessels not shown (recirculation); b) the mixture disposed in the mixing chamber 1 is pressed out; and c) the walls of the mixing chamber 1 are freed from mixture residues. Simultaneously with the movement of the piston 3, the restriction piece 15 is moved to the top to such an extent that it fully uncovers the mixing chamber outlet 5. By this means, there are not only facilitated the working steps according to b) and c) but, in particular, the mixture residues which have accumulated on the left-hand surface of the restriction piece 15 are removed.

85 The uppermost (rearmost) position of the restriction piece 15 is brought about in that the pressure, which has kept the stop piston 25 in the shown position during the mixing operation despite the abutting contact of the working piston 13, is reduced in the pressure chamber 31. This causes the stop piston 25 to pass into the upper end position (abutting contact with the face 30), and the working piston 13 can move correspondingly further to the top, thus causing the mixing chamber outlet 5 to be fully uncovered.

The extent of the covering of the mixing chamber outlet 5 in the throttling position of the restriction piece 15 is determined by the position of the threaded part 26 and consequently that of the collar 28. By this means, there comes about a stroke *h* which determines the throttling position.

100 It is conceivable to provide in the pressure chamber 31 a compression spring (Belleville spring) which bears against the face 30 and presses the stop piston 25 in the downward direction. If a constant pressure (supply of the pressure medium via the bore 33) then furthermore prevails in the pressure chamber above the working piston 13, the three positions of the cleaning ram 14 can be brought about only by a change in the pressure of the pressure medium entering via the bore 34.

Fig. 2 shows like Fig. 1 a mixing chamber (which is smaller herein) 41, the piston 43, the mixing chamber outlet 35, the mixing chamber housing 36, the inlets 8, 9 and the housing part 18 with the circular recess for the reception of the cleaning ram 38. In this exemplified embodiment, the ram is circular in design, the diameter of the channel 39, which is formed by a housing part 42, for calming the mixture being larger than the diameter of the mixing chamber 41. Fig. 2 shows a possible position of restricting the mixture flowing from the mixing chamber 41 into the channel 39. In this restricting position, the lower end of the cleaning ram 38, namely the restriction piece 40, covers a little more than half the mixing chamber outlet 35.

CLAIMS

1. A device for feeding a plastics material mixture, to a mould, said device comprising a mixing chamber having a piston movable between
5 a rear position, in which the inlets for the components of the mixture are left open and a front position in the region of the mixing chamber outlet where the inlets are closed off from the mixing chamber outlet, a channel which preferably
10 directly adjoins the mixing chamber outlet and communicates, directly or via further supply lines, to the mould and which is positioned relative to the mixing chamber axis at an angle, and a cleaning ram in said channel, for movement
15 between a rear position and a cleaning position, the cleaning ram being so formed that it serves at its leading end, as a throttling restriction piece, and partly covers the mixing chamber outlet, a piston and cylinder device for said cleaning ram,
20 the actuating piston thereof or the cleaning ram bearing in its rear position against a stop which is displaceable for setting different limit positions, and means for permitting a temporary
25 displaceability of the stop (25a) during the operation of the mixing head whereby the mixing

chamber outlet can be fully uncovered.

2. A device as claimed in Claim 1, wherein the displaceable stop (25a) is in operative
30 communication with said piston and cylinder device (25, 23a, 28) which operates with a pressure medium, preferably hydraulic oil.

3. A device as claimed in Claim 2, wherein an end of the piston (25) of the piston and cylinder device serves as a stop (25a).

35 4. A device as claimed in Claim 2 or 3, wherein the piston of the piston and cylinder device serves as said stop and is designed as an annular piston, in the annular bore of which there is provided a shank (27) which can be locked in the housing
40 (18, 19, 23) of the cleaning ram (14) in different longitudinal positions, said shank having a collar (28) which determines the front position of the restriction piece (15), whilst another fixed stop (30) on the housing of the cleaning ram
45 determines the rearmost position of the latter during uncovering of the mixing chamber outlet (5; 35).

5. A device for feeding a plastics material mixture substantially as described with reference
50 to Fig. 1 or Fig. 2 of the accompanying drawings.